Data Evaluation Report on the adsorption-desorption of RPA 221607, a degradate of fenamidone, in soil

PMRA Submission Number {.....} EPA MRID Number 45930003

Data Requirement: PMRA Data Code:
EPA DP Barcode: D275213
OECD Data Point:
EPA Guideline: 163-1

Test material:
Common name: RPA 221607 (a degradate of fenamidone).
Chemical name
IUPAC: (S)-5-Methyl-3-(4-nitrophenylamino)-5-phenylimidazolidine-2,4-dione.
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(4-nitrophenyl)amino]-5-phenyl-, (S)-.
CAS No: Not reported.
Synonyms: S-enantiomer of the racemic compound RPA 409446.
SMILES string:

Primary Reviewer: Kindra Bozicevich
Dynamac Corporation

Signature: Kindra Bozicevich
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Date: 8th Sept., 2003

Company Code:
Active Code:
Use Site Category:
EPA PC Code: 046679

CITATION: Chipping, N. and C. Burr. 2001. [^{14}C]-RPA 221607 adsorption and desorption to and from four soils and a sediment. Unpublished study performed and sponsored by Aventis CropScience UK Ltd, Essex, UK; submitted by Bayer CropScience. Laboratory Project ID: 25112A. Experimental initiation September 21, 2000, and completion February 27, 2001 (p. 6). Final report issued March 8, 2001.

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CONCLUSIONS:

Administrative: This study is acceptable and provides information on the sorption behaviour of the degradate RPA- 221607. Together with batch-equilibrium adsorption/desorption studies conducted with parent fenamidone and other degradates as the test substance, the study conducted with RPA-221607 may be used to satisfied the USEPA 163-1 data requirements.

Scientific: The degradate RPA-221607 show high to intermediate mobility depending on the soil. Adsorption was essentially linear within the experimental range of concentratrion. Considerable hysteresis was observed between the adsorption and desorption isotherms.

EXECUTIVE SUMMARY:

The adsorption/desorption characteristics of [phenyl-U-^{14}C](S)-5-methyl-3-(4-nitrophenyl-amino)-5-phenylimidazolidine-2,4-dione (RPA 221607) were studied in a silt loam soil [96/19; pH 6.2, organic carbon 0.5%] and a sandy loam soil [pH 4.8, organic carbon 1.2%], each from the U.S., and a silt loam soil [97/10; pH 8.1, organic carbon 1.9%], a sandy clay loam sediment [00/03; pH 8.2, organic carbon 2.3%], and a loam soil [98/26; pH 7.0, organic carbon 1.9%], each from the UK, in a batch equilibrium experiment. The experiment was conducted in accordance with the U.S. EPA Pesticide Assessment Guidelines, Subdivision N, Section 163-1, and in compliance with the OECD GLP. The adsorption phase of the study was carried out by equilibrating air-dried soil with [^{14}C]RPA 221607 at nominal concentrations of 0.1, 0.4, 2.0, and 14.0 mg a.i/kg soil in the dark at 20 ± 1°C for 1 hour for the silt loam 97/10 soil and sandy clay loam 00/03 sediment, and 24 hours for the silt loam 96/19 soil, sandy loam 98/32 soil, and loam 98/26 soil. The equilibrating solution used was 0.01M $CaCl_2$, with soil/solution ratios of 1:5 (w:v) for all the soils and the sediment. The desorption phase of the study was carried out by replacing the adsorption solution with an equivalent volume of pesticide-free 0.01M $CaCl_2$ solution and equilibrating in the dark for 1 hour at 20°C. The desorption step was conducted a total of five times.

The supernatant solution after adsorption, desorption, and extraction was separated by centrifugation, decanted and aliquots were analyzed for total radioactivity using LSC. Following desorption and extraction, the soils were combusted and analyzed for total radioactivity using LSC. High-dose supernatant samples were analyzed using HPLC.

[^{14}C]RPA 221607 was stable in the adsorption and desorption supernatants of all four test soils. [^{14}C]RPA 221607 showed slight degradation in the sediment during the adsorption phase; degradation was 2.34% of the applied. The mass balance at the end of the adsorption phase of the study was not reported. Mass balances at the end of the desorption phase (fifth desorption

step) were 91.45-102.37%, 92.54-99.31%, 95.57-99.83%, 92.62-98.26%, and 91.58-104.4% of the applied for the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively.

After 1 hour of equilibration, 25.7-35.0% and 55.1-58.0% of the applied [^{14}C]RPA 221607 was adsorbed to the silt loam 97/10 soil and sandy clay loam sediment, respectively. After 24 hours of equilibration, 20.3-32.0%, 33.4-43.5%, and 63.0-68.3% of the applied was adsorbed to the silt loam 96/19, sandy loam, and loam soils, respectively. Adsorption K_d values were 1.9733, 3.5727, 2.6898, 8.2787, and 11.8766 for the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively; corresponding K_{oc} values were 264, 216, 98, 242, and 393. At the end of the desorption phase, 74.7-88.6%, 73.1-88.2%, 85.3-98.7%, 73.3-87.8%, and 54.8-71.2% of the applied [^{14}C]RPA 221607 was desorbed from the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively. Desorption K_d values were 19.18, 9.75, 26.64, 16.95, and 22.83 for the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively; corresponding K_{oc} values were 3836, 812, 1402, 652, and 1202.

$$Kd = \frac{\left[\frac{(C_0V_0 - C_{eq}V_0)}{m}\right]}{C_{eq}}$$

The reviewer-calculated r^2 value for the relationship of Kd vs. % organic carbon is 0.4038, for Kd vs. pH is 0.0951, and for Kd vs. % clay is 0.4092. Desorption K and K_{oc} values were higher than those obtained for adsorption.

Results Synopsis: The reviewer calculated adsorption Kd values using the following equation:

Soil type: Silt loam 96/19
Amount adsorbed: 20.3-32.0% of the applied
Adsorption K_d: 1.9733
Adsorption K_{oc}: 264
Amount desorbed: 74.7-88.6% of the adsorbed
Desorption K_d: 19.18
Desorption K_{oc}: 3836

Soil type: Sandy loam 98/32
Amount adsorbed: 33.4-43.5% of the applied
Adsorption K_d: 3.5727
Adsorption K_{oc}: 216
Amount desorbed: 73.1-88.2% of the adsorbed
Desorption K_d: 9.75
Desorption K_{oc}: 812

Soil type: Silt loam 97/10
Amount adsorbed: 25.7-35.0% of the applied
Adsorption K_d: 2.6898
Adsorption K_{oc}: 98
Amount desorbed: 85.3-98.7% of the adsorbed
Desorption K_d: 26.64
Desorption K_{oc}: 1402

Soil type: Sandy clay loam 00/03
Amount adsorbed: 55.1-58.0% of the applied
Adsorption K_d: 8.2787
Adsorption K_{oc}: 242
Amount desorbed: 73.3-87.8% of the adsorbed
Desorption K_d: 16.95
Desorption K_{oc}: 652

Soil type: Loam 98/26
Amount adsorbed: 63.0-68.3% of the applied
Adsorption K_d: 11.8766
Adsorption K_{oc}: 393
Amount desorbed: 54.8-71.2% of the adsorbed
Desorption K_d: 22.83
Desorption K_{oc}: 1202

The reviewer-calculated adsorption K_d values were slightly higher than those calculated by the study authors.

Results Synopsis: The study authors calculated adsorption K values using the following Freundlich isotherm equation: $C_{s1} = K_F \times C_{w1}^{(1/n)}$.

Soil type: Silt loam 96/19
Amount adsorbed: 20.3-32.0% of the applied
Freundlich K_{ads}: 1.32
Freundlich adsorption K_{oc}: 264
Amount desorbed: 74.7-88.6% of the adsorbed
Freundlich K_{des}: 19.18
Freundlich desorption K_{oc}: 3836

Soil type: Sandy loam 98/32
Amount adsorbed: 33.4-43.5% of the applied
Freundlich K_{ads}: 2.59

Freundlich adsorption K_{oc}: 216
Amount desorbed: 73.1-88.2% of the adsorbed
Freundlich K_{des}: 9.75
Freundlich desorption K_{oc}: 812

Soil type: Silt loam 97/10
Amount adsorbed: 25.7-35.0% of the applied
Freundlich K_{ads}: 1.86
Freundlich adsorption K_{oc}: 98
Amount desorbed: 85.3-98.7% of the adsorbed
Freundlich K_{des}: 26.64
Freundlich desorption K_{oc}: 1402

Soil type: Sandy clay loam 00/03
Amount adsorbed: 55.1-58.0% of the applied
Freundlich K_{ads}: 6.29
Freundlich adsorption K_{oc}: 242
Amount desorbed: 73.3-87.8% of the adsorbed
Freundlich K_{des}: 16.95
Freundlich desorption K_{oc}: 652

Soil type: Loam 98/26
Amount adsorbed: 63.0-68.3% of the applied
Freundlich K_{ads}: 7.47
Freundlich adsorption K_{oc}: 393
Amount desorbed: 54.8-71.2% of the adsorbed
Freundlich K_{des}: 22.83
Freundlich desorption K_{oc}: 1202

For the four test soils and sediment, adsorption of RPA 221607 was not fully reversible, with hysteresis in the adsorption/desorption curve. Desorption K values increased with each desorption step.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was conducted according to the EU Commission Directive 95/36/EC (July 1995) and the U.S. EPA Pesticide Assessment Guidelines, Subdivision N, Section 163-1 (1982; p. 16). A significant deviation from Subdivision N § 163-1 guidelines was:

The study was conducted using a degradate of fenamidone rather than the parent compound. This does not affect the validity of the study.

COMPLIANCE: The study was conducted in compliance with OECD Good Laboratory Practice Standards (1999; p. 3). Signed and dated No Data Confidentiality, GLP, Quality Assurance, and Certificate of Authenticity statements were provided (pp. 2-5).

A. MATERIALS:

1. Test Material [Phenyl-U-^{14}C](S)-5-methyl-3-(4-nitrophenylamino)-5-phenylimidazolidine-2,4-dione (RPA 221607; p. 16).

Chemical Structure: See DER Attachment 2.

Description: Not provided. It was only stated that the test material was supplied in acetonitrile (p. 17).

Purity:
Radiolabelled: Analytical purity: Not reported.
Radiochemical purity: 98.7% (p. 17).
Batch No. DCR3/1.
Specific activity: 94.6 µCi/mg.
Location of the label: Uniformly labeled in the phenyl ring.

Non-radiolabelled: Analytical purity: 96.6% (Table 27, p. 52).
Batch No. DP1150.

Storage conditions of

test chemicals: Not reported.

Physico-chemical properties of RPA 221607:

Parameter	Values	Comments
Water solubility	5.69 mg/L.	
Vapour pressure	Not reported.	
UV absorption	Not reported.	
Molecular Formula	$C_{16}H_{14}N_4O_4$	
Molecular Weight	326.3 g/mole	
Melting point	Not reported.	
Bulk density	Not reported.	
pK_a	Not reported	
K_{ow}	Not reported	
Stability of Compound at room temperature	Not reported	

Data were obtained from pp. 16-17 and Appendix 3, pp. 86-87 of the study report.

2. Soil Characteristics

Table 1: Description of soil collection and storage.

Description	Silt loam 96/19	Sandy loam 98/32	Silt loam 97/10	Sandy clay loam 00/03	Loam 98/26
Geographic location	Delta Research Farm, Leland, MS	Hill Top Farm, Iola, WI	Adisham Court Farm, Canterbury, Kent, UK	Boarded Barns Farm, Ongar, Essex, UK	Boarded Barns Farm, Ongar, Essex, UK
Pesticide use history at the collection site	Not reported	Not reported	Not reported	Not reported	Not reported
Collection procedures	Not reported	Not reported	Not reported	Not reported	Not reported
Sampling depth (cm)	Not reported	Not reported	Not reported	Not reported	Not reported
Storage conditions	Not reported	Not reported	Not reported	Not reported	Not reported
Storage length	Not reported	Not reported	Not reported	Not reported	Not reported
Soil preparation	Air dried; sieved, 2 mm.	Air dried; sieved, 2 mm.	Air dried; sieved, 2 mm.	Air dried; partially sieved, 2 mm.	Air dried; sieved, 2 mm.

Data were obtained from p. 17; Table 1, p. 32; Appendix 8, pp. 112-115 of the study report.

Table 2: Properties of the soils.

Property	96/19	98/32	97/10	00/03	98/26
Soil Texture	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
% sand	18.60	62.61	10.59	49.59	25.42
% silt	73.17	31.04	65.10	24.43	49.46
% clay	8.23	6.35	24.31	25.98	25.12
pH Water 0.01M $CaCl_2$ 1M KCl	 6.2 5.1 4.8	 4.8 4.2 3.8	 8.1 7.5 7.7	 8.2 7.7 7.7	 7.0 6.4 6.7
Organic carbon (%)	0.5	1.2	1.9	2.3	1.9
Organic matter (%)	0.9	2.1	3.3	4.5	3.3
CEC (meq/100 g)	5.7	17.0	65.7	41.5	10.0
Moisture at 1/3 atm (%)	25.41	12.80	25.86	31.25	20.70
Bulk density (g/mL)	Not reported	Not reported	Not reported	Not reported	Not reported
Biomass (mg microbial C/100 g or CFU or other)	Not reported	Not reported	Not reported	Not reported	Not reported
Soil taxonomic classification[1]	Fine-loamy, Mixed, Thermic Mollic Hapludalfs.	Coarse-loamy, Mixed Typic Glossoboralfs.	Fine-silty, Mixed, Mesic Typic Eutrochrept.	Not reported.	Fine-loamy, Mixed, Mesic Typic Hapludalfs.
Sol mapping unit (for EPA)	Not reported	Not reported	Not reported	Not reported	Not reported

Data were obtained from Table 1, p. 32 and Appendix 8, pp. 112-115 of the study report.

C. STUDY DESIGN:

1. Preliminary study:

To determine the solubility of RPA 221607, approximately 0.5 mg of RPA 221607 (0.125 mL of stock solution) of [^{14}C]RPA 221607, dissolved in acetonitrile, was weighed into a "suitable container" and 20 mL of deionized water was added to the flask (Appendix 3, p. 86). The solution was mixed in an ultrasonic bath for approximately 24 hours at 20°C, then filtered through two 0.1-µm filters. The solubility of RPA 221607 was determined by HPLC on a calibration curve using a series of different test concentrations of unlabeled RPA 221607. The

solubility of RPA 221607 was determined to be 5.69 mg/L (p. 17; Appendix 3, p. 87).

Additional preliminary experiments were conducted to determine: (i) adsorption of the test substance to the test vessels; (ii) the equilibration time and soil:solution ratio to be used in the definitive study; and (iii) the stability of the test substance under the equilibrium conditions.

To determine whether the test substance adsorbed to glass tubes, 75 mL of a solution containing 0.09 mg/L of [^{14}C]RPA 221607 in 0.01M $CaCl_2$ solution were added to two borosilicate screw-capped glass tubes externally coated with plastic, and the tubes were tightly capped and shaken on an end-over-end shaker in the dark at 20 ± 1°C for 24 hours (p. 18). Aliquots of the solutions were analyzed for total radioactivity using LSC. Recoveries of the tubes were higher than expected, so an additional tube was analyzed using LSC. Results showed that [^{14}C]RPA 221607 did not adsorb to the glass tubes; the mean recovery was 109.29% (98.77-121.61%; p. 25; Table 3, p. 33).

To determine the soil:solution ratio to be used in the definitive study, soil:solution ratios of 1:20, 1:10 and 1:5 (w:v) were prepared by adding aliquots of a solution containing 0.09 mg/L of [^{14}C]RPA 221607 in 0.01M $CaCl_2$ solution to borosilicate screw-capped glass tubes containing 3, 6, and 15 g (oven dried equivalent weight) of each test soil and sediment (p. 18). The tubes were tightly capped, shaken by hand to suspend the soil, then shaken on an end-over-end shaker in the dark at 20 ± 1°C for 24 hours. The tubes were removed and the samples were centrifuged for 10 minutes at 830 rcf (relative centrifuge force). Aliquots of the supernatants were analyzed for total radioactivity using LSC. Soil:solution ratios of 1:5 (w:v) yielded recoveries of 24.33-68.75% of the applied in the supernatants (Table 4, p. 34). Soil:solution ratios of 1:10 and 1:20 (w:v) yielded recoveries of 42.23-82.30% and 59.56-91.30% of the applied, respectively, in the supernatants.

To determine the equilibration time to be used in the definitive adsorption phase of the study, 60 mL of a 0.01M $CaCl_2$ solution containing [^{14}C]RPA 221607 were added to borosilicate screw-capped glass tubes containing eight portions, weighing 4 g ode (oven dried equivalent weight), of each test soil and sediment (pp. 19-20). The tubes were shaken by hand to suspend the soil, then shaken on an end-over-end shaker in the dark at 20 ± 1° C for 1, 2, 4, 6, 24, and 48 hours. The samples were centrifuged at 830 rcf for 10 minutes and triplicate aliquots of the supernatants were analyzed for total radioactivity using LSC. Results showed an initial, rapid decrease in radioactivity in the supernatants, that was followed by a gradual decrease with little change after 24 hours (p. 25; Figure 1, p. 53). Significant degradation was observed in the silt loam 97/10 soil (up to 15% of the applied) and the sandy clay loam sediment (up to 8% of the applied) samples (p. 25). These two test soils had pH values of 7.5 and 7.7 in $CaCl_2$ solution, respectively, compared to lower pH values of 5.1 for the silt loam 96/19 soil, pH 6.4 for the clay loam soil, and pH 4.2 for the sandy loam soil. Two additional tubes of the silt loam 97/10 soil and sandy clay loam sediment were analyzed after 1 and 2 hours of shaking on an end-over-end

shaker as described above. The supernatants for these samples were immediately analyzed using LSC. RPA 221607 did not significantly degrade after 1 hour of adsorption. Degradation of [^{14}C]RPA 221607 ranged from 0.99-15.73%, 0-8.16%, and 0-4.52% of the applied for the silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively; Table 18, p. 48). No degradation was observed for the silt loam 96/19 and sandy loam 98/32 soils.
To determine the equilibration time to be used in the definitive desorption phase of the study, 75 mL of a 0.01M $CaCl_2$ solution containing [^{14}C]RPA 221607 were added to borosilicate screw-capped glass tubes containing eight portions weighing 15 g (oven dried equivalent weight) of each test soil and sediment (pp. 20-21). The tubes were tightly capped, then shaken on an end-over-end shaker in the dark at 20 ± 1° C. The silt loam 96/19, sandy loam, and loam soils were shaken for 24 hours, and the silt loam 97/10 and sandy clay loam sediment were shaken for 1 hour. The samples were then centrifuged at 830 rcf for 10 minutes, and the supernatants were decanted and replaced with pesticide-free 0.01M $CaCl_2$. The tubes were then placed in the dark at 20°C and shaken on an end-over-end shaker for 1, 2, 4, 6, 24, and 48 hours (p. 21). The samples were centrifuged at 830 rpm for 10 minutes and aliquots of the supernatants were analyzed for total radioactivity using LSC. In the four test soils and one sediment, there was little change in radioactivity in solution between after 1 hour and 24 hours (p. 25; Figure 2, p. 53). Degradation was <1% for all test soils and the sediment after 1 hour of shaking (Table 19, p. 49).

Based on the results of the preliminary studies, it was determined that a soil:solution ratio of 1:5; an adsorption equilibration time of 24 hours for the silt loam 96/19, sandy loam 98/32, and loam 98/26 soils; an adsorption equilibrium time of 1 hour for the silt loam 97/10 soil and sandy clay loam 00/03 sediment; and a desorption time of 1 hour would be used in the definitive study (p. 25). A maximum test concentration of 2.8 mg/L (50% of the aqueous solubility) was selected for use in the definitive study, as recommended in the OECD guidelines (p. 17). It was also concluded that since [^{14}C]RPA 221607 did not adsorb to the test tubes, further preparation of the test tubes for use in the definitive study was not required

2. Definitive study experimental conditions:

Table 3: Study design for the adsorption phase.

Parameters	**Silt loam 96/19**	**Sandy loam 98/32**	**Silt loam 97/10**	**Sandy clay loam 00/03**	**Loam 98/26**
Condition of soil (air dried/fresh)	Air-dried	Air-dried	Air-dried	Partially air-dried	Air-dried
Have these soils been used for other laboratory studies ? (specify which)	Yes, MRID 45930002	Yes, MRID 45930002	Yes, MRID 45930002	No	Yes, MRID 45930002
Soil (g/replicate)	15	15	15	15	15

Parameters		**Silt loam 96/19**	**Sandy loam 98/32**	**Silt loam 97/10**	**Sandy clay loam 00/03**	**Loam 98/26**
Equilibrium solution used (name and concentration; eg: 0.01N $CaCl_2$)		0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$
Control used (with salt solution only) (Yes/No)		No	No	No	No	No
Test material concentrations[1]	Nominal application rates (mg a.i./kg soil)	0.1, 0.4, 2.0, 14.0	0.1, 0.4, 2.0, 14.0	0.1, 0.4, 2.0, 14.0	0.1, 0.4, 2.0, 14.0	0.1, 0.4, 2.0, 14.0
	Analytically measured concentrations (mg a.i./kg soil)	0.092, 0.364, 1.993, 14.983	0.092, 0.364, 1.993, 14.983	0.092, 0.364, 1.993, 14.983	0.092, 0.364, 1.993, 14.983	0.092, 0.364, 1.993, 14.983
Identity and concentration of co-solvent, if any		Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.
Soil:solution ratio		1:5	1:5	1:5	1:5	1:5
Initial pH of the equilibration solution, if provided		Not reported	Not reported	Not reported	Not reported	Not reported
No. of replications	Controls	0	0	0	0	0
	Treatments	2	2	2	2	2
Equilibration	Time (hours)	24	24	1	1	24
	Temperature (°C)	20 ± 1	20 ± 1	20 ± 1	20 ± 1	20 ± 1
	Darkness	Yes	Yes	Yes	Yes	Yes
	Shaking method	End-over-end shaker	End-over-end shaker	End-over-end shaker	End-over-end shaker	End-over-end shaker
	Shaking time (hours)	24	24	1	1	24
Method of separation of supernatant (eg., centrifugation)		Centri-fugation	Centri-fugation	Centri-fugation	Centri-fugation	Centri-fugation
Centrifugation	Speed (rcf)	830	830	830	830	830
	Duration (min)	10	10	10	10	10

Parameters		Silt loam 96/19	Sandy loam 98/32	Silt loam 97/10	Sandy clay loam 00/03	Loam 98/26
	Method of separation of soil and solution	Decanted	Decanted	Decanted	Decanted	Decanted

Data were obtained from pp. 17-18, 22, 25 and Table 5, p. 34 of the study report.
[1] Test material concentrations were calculated by the reviewer as follows: [nominal test concentration (mg/L) x total volume of test material solution (mL)] ÷ amount of soil (g); eg. [0.02 mg/L x 75 mL) ÷ 15.0 g = 0.1 mg a.i./kg soil.

Table 4: Study design for the desorption phase.

Parameters		Silt loam 96/19	Sandy Loam 98/32	Silt loam 97/10	Sandy clay loam 00/03	Loam 98/26
Were the soil residues from the adsorption phase used? If not, describe the method for adsorption using a separate adsorption Table		Yes	Yes	Yes	Yes	Yes
Amount of test material present in the adsorbed state/adsorbed amount (mg a.i./kg soil)	0.1	0.0320	0.0435	0.0350	0.0580	0.0683
	0.4	0.1076	0.1529	0.1218	0.2204	0.2566
	2.0	0.4558	0.6677	0.6045	1.1447	1.2640
	14.0	2.8445	5.0488	3.6008	7.9413	8.8224
No. of desorption cycles		5	5	5	5	5
Equilibration solution and quantity used per treatment for desorption (eg., 0.01M $CaCl_2$)		0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$
Soil:solution ratio		1:5	1:5	1:5	1:5	1:5
Replications	Controls	0	0	0	0	0
	Treatments	2	2	2	2	2
Desorption equilibration	Time (hours)	1	1	1	1	1
	Temperature (°C)	20	20	20	20	20
	Darkness	Yes	Yes	Yes	Yes	Yes
	Shaking method	End-ever-end shaker	End-ever-end shaker	End-ever-end shaker	End-ever-end shaker	End-ever-end shaker

Parameters		Silt loam 96/19	Sandy Loam 98/32	Silt loam 97/10	Sandy clay loam 00/03	Loam 98/26
	Shaking time (hours)	1	1	1	1	1
Centrifugation	Speed (rcf)	830	830	830	830	830
	Duration (min)	10	10	10	10	10
	Method of separation of soil and solution	Decanted	Decanted	Decanted	Decanted	Decanted
Second through fifth desorption	Indicate if the method is the same as the first desorption cycle	Same	Same	Same	Same	Same

Data were obtained from p. 22; Tables 8-12, pp. 36-37; and Appendices 5-7, pp. 89-111 of the study report.

3. Description of analytical procedures:

Extraction/clean up/concentration methods: Following the final desorption step, 75 mL of acetonitrile:water (1:1, v:v) were added to one tubes of each test soil and sediment, and the tubes were weighed and shaken to resuspend the soil (p. 22). The tubes were shaken on a wrist action shaker for 20 minutes, reweighed, then centrifuged at approximately 830 rcf (relative centrifuge force) for 10 minutes, and the supernatants were removed (method unspecified). The tubes and soil pellets were weighed so that the weight of the supernatants could be calculated. Aliquots of the supernatants were analyzed for total radioactivity using LSC.

Total ^{14}C measurement: Following adsorption, desorption and extraction, aliquots of the supernatants were analyzed for total radioactivity using LSC (p. 23). Following the final desorption or extraction, the soil residues were air-dried, weighed, and ground to a fine powder. Triplicate subsamples (0.1-0.3 g) were analyzed for total radioactivity using LSC following combustion. Combustion efficiency was not reported.

Non-extractable residues, if any: Not applicable.

Derivatization method, if used: A derivatization method was not employed in the study.

Identification and quantification of parent compound: Following adsorption and desorption, duplicate aliquots of the high-dose supernatant samples were analyzed by HPLC (p. 23).

Identification and quantification of RPA 221607 were performed by HPLC using the following operating conditions: Kromasil KR100 5C1 column (4.6 mm × 250 mm; particle size not reported), isocratic mobile of acetonitrile:water (40:60, v:v), flow rate 1 mL/minute, with radiometric and UV (230 nm) detection. The identity of RPA 221607 was confirmed by chromatographic comparison of the HPLC retention time of an unlabelled RPA 221607 reference standard. The high-dose adsorption and desorption supernatants were analyzed on the day of sampling (Table 2, p. 33).

Identification and quantification of transformation products, if appropriate: Samples were not analyzed for transformation products of RPA 221607.

Detection limits (LOD, LOQ) for the parent compound: The limit of detection for LSC analysis of RPA 221607 was reported to be 0.038 ng/g (p. 24; Appendix 9, p. 116). The limit of detection for HPLC analysis of RPA 221607 was reported to be 0.000151 µg/g. The limits of quantification for LSC and HPLC analysis was not reported.

Detection limits (LOD, LOQ) for the transformation products: Samples were not analyzed for transformation products of RPA 221607.

II. RESULTS AND DISCUSSION

A. TEST CONDITIONS: [^{14}C]RPA 221607 was stable in the adsorption and desorption supernatants of all four test soils (p. 29; Table 20, p. 49). [^{14}C]RPA 221607 showed slight degradation in the sediment during the adsorption phase; degradation was 2.34% of the applied. It was stated that the temperature was maintained at 20 ± 1°C throughout the study; however, temperature records were not provided. The pH of the test solutions were not reported.

B. MASS BALANCE: The mass balance at the end of the adsorption phase of the study was not reported. Mass balances at the end of the desorption phase (fifth desorption step) were 91.45-102.37%, 92.54-99.31%, 95.57-99.83%, 92.62-98.26%, and 91.58-104.4% of the applied for the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively (Tables 21-25, pp. 50-51).

Table 5: Recovery of [^{14}C]-RPA 221607, expressed as percentage of applied radioactivity, in soil after adsorption/desorption (mean ± s.d.).

Matrices	Silt loam 96/19	Sandy loam 98/32	Silt loam 97/10	Sandy clay loam 00/03	Loam 98/26
At the end of the adsorption phase					
Supernatant solution	66.6 ± 6.2	55.0 ± 5.8	61.2 ± 4.8	34.5 ± 3.3	27.4 ± 5.9
Solid phase (total ^{14}C)	Not analyzed.				
Non-extractable residues in soil, if measured	Not measured.				
Total recovery	Not reported.				
At the end of the desorption phase					
Supernatant solution (Desorption 1)	14.7 ± 3.7	20.1 ± 0.8	19.8 ± 0.6	19.9 ± 1.2	15.8 ± 2.0
Supernatant solution (Desorption 2)	5.4 ± 0.7	8.2 ± 0.9	7.7 ± 1.0	12.4 ± 0.4	10.6 ± 0.8
Supernatant solution (Desorption 3)	2.3 ± 0.6	3.8 ± 0.6	3.6 ± 0.8	8.1 ± 0.4	6.9 ± 0.3
Supernatant solution (Desorption 4)	1.4 ± 0.6	2.2 ± 0.4	1.7 ± 0.5	5.2 ± 0.6	5.2 ± 0.3
Supernatant solution (Desorption 5)	0.9 ± 0.3	1.4 ± 0.3	1.0 ± 0.3	3.7 ± 0.5	3.9 ± 0.4
Solid phase (extracted)[1]	1.6[1]	3.1[1]	1.1[1]	5.9[1]	7.3 ± 6.8
Non-extractable residues in soil, if measured	5.9 ± 3.0	7.1 ± 3.3	3.2 ± 2.6	12.0 ± 5.8	25.6 ± 9.6
Total recovery	97.5 ± 3.2	97.0 ± 2.3	98.1 ± 1.4	96.6 ± 1.9	96.8 ± 4.8

Data were obtained from Tables 21-25, pp. 50-51 of the study report.

[1] Single replicates for high-dose soils were extracted prior to combustion.

Table 6: Concentration of [^{14}C]RPA 221607 in the solid and liquid phases at the end of adsorption equilibration period (mean ± s.d.).

Concentration (mg a.i./kg soil)	Silt loam 96/19			Sandy loam 98/32			Silt loam 97/10		
	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]
0.1	0.0320 ± 0.0	0.0117 ± 0.0	32.0 ± 3.3	0.0435 ± 0.0	0.0095 ± 0.0	43.5 ± 1.1	0.0350 ± 0.0	0.0109 ± 0.0	35.0 ± 1.1
0.4	0.1076 ± 0.0	0.0505 ± 0.0	26.9 ± 0.3	0.1529 ± 0.0	0.0403 ± 0.0	38.2 ± 1.1	0.1218 ± 0.0	0.0463 ± 0.0	30.5 ± 0.1
2.0	0.4558 ± 0.0	0.3036 ± 0.0	22.8 ± 0.9	0.6677 ± 0.0	0.2578 ± 0.0	33.4 ± 1.2	0.6045 ± 0.0	0.2635 ± 0.0	30.2 ± 0.1
14.0	2.8445 ± 0.0	2.3902 ± 0.0	20.3 ± 0.0	5.0488 ± 0.3	1.9141 ± 0.0	36.1 ± 1.8	3.6008 ± 0.1	2.1750 ± 0.0	25.7 ± 0.4

Concentration (mg a.i./kg soil)	Sandy clay loam 00/03			Loam 98/26		
	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]
0.1	0.0580 ± 0.0	0.0063 ± 0.0	58.0 ± 0.0	0.0683 ± 0.0	0.0043 ± 0.0	68.3 ± 0.6
0.4	0.2204 ± 0.0	0.0258 ± 0.0	55.1 ± 0.2	0.2566 ± 0.0	0.0195 ± 0.0	64.2 ± 0.6
2.0	1.1447 ± 0.0	0.1579 ± 0.0	57.2 ± 0.2	1.2640 ± 0.0	0.1385 ± 0.0	63.2 ± 0.5
14.0	7.9413 ± 0.5	1.2897 ± 0.1	56.7 ± 3.6	8.8224 ± 0.0	1.1604 ± 0.0	63.0 ± 0.0

Data were obtained from Tables 8-12, pp. 36-37 and Appendices 5-7, pp. 89-111 of the study report.

[1] The concentration remaining on the soil was calculated by the study authors as the difference between the amount of RPA 221607 in the tube at the start of the cycle and the total amount in the aqueous phase (p. 27). An allowance was made for the residual water remaining on the soil pellet following centrifugation.

[2] Percent adsorbed was calculated by the reviewer as follows: [concentration on soil (mg a.i./kg) ÷ nominal test concentration (mg a.i./kg)] x 100; [eg. 0.03436 mg a.i./kg ÷ 0.1 mg a.i./kg] x 100% = 34.36%.

Table 7: Concentration of [^{14}C]RPA 221607 in the solid and liquid phases at the end of desorption (n=5).

Concentration (mg a.i./kg soil)	Silt loam 96/19			Sandy loam 98/32			Silt loam 97/10		
	on soil (mg a.i./kg)[1]	in solution (µg	% desorbed as %	on soil (mg a.i./kg)	in solution (µg	% desorbed as %	on soil (mg a.i./kg)[1]	in solution (µg	% desorbed as %
0.1	0.0115	0.0002 ±	74.7 ±	0.0137	0.0003	73.1 ±	0.0068	0.0003	85.3 ±
0.4	0.0304	0.0007 ±	79.8 ±	0.0395	0.0011	78.0 ±	0.0168	0.0009	89.2 ±
2.0	0.0540*	0.0035 ±	80.0 ±	0.0239*	0.0055*	84.5 ±	0.0939	0.0034	95.2 ±
14.0	0.6452	0.0160 ±	88.6 ±	1.2309	0.0300	88.2 ±	0.4097	0.0166	98.7 ±

Concentration (mg a.i./kg soil)	Sandy clay loam 00/03			Loam 98/26		
	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% desorbed as % of the adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% desorbed as % of the adsorbed[2]
0.1	0.0181 ± 0.0	0.0008 ± 0.0	73.3 ± 0.4	0.0357 ± 0.0	0.0007 ± 0.0	54.8 ± 0.3
0.4	0.0581 ± 0.0	0.0030 ± 0.0	77.1 ± 0.1	0.1202 ± 0.0	0.0030 ± 0.0	57.1 ± 0.3
2.0	0.2633 ± 0.0	0.0150 ± 0.0	81.1 ± 0.3	0.4477 ± 0.0	0.0162 ± 0.0	62.5 ± 0.4
14.0	1.7911 ± 0.4	0.0915 ± 0.0	87.8 ± 0.5	3.2044 ± 0.0	0.0997 ± 0.0	71.2 ± 0.9

Data were obtained from Tables 13-17, pp. 38-47; Tables 21-25, pp. 50-51; and Appendices 5-7, pp. 89-111 of the study report.

[1] The concentration remaining on the soil was calculated by the study authors as the difference between the amount of RPA 221607 in the tube at the start of the cycle and the total amount in the aqueous phase (p. 27). An allowance was made for the residual water remaining on the soil pellet following centrifugation.

[2] Percent desorbed as % of the adsorbed was calculated by the reviewer as follows: [% desorbed (Desorption 1+2+3+4+5) ÷ (% total recovery - % adsorbed)] x 100; e.g. [(14.5% + 4.23% + 1.69% + 0.82% + 0.53%) ÷ (98.28% - 73.73%)] x 100 = 88.7%.

* Data are for one sample. Results for the second tube appeared to be an outlier and were excluded from the Freundlich calculations.

** Data are for one sample only since the second tube (Tube 921) broke during the first desorption step.

Table 8: Adsorption and desorption constants of [^{14}C]RPA 221607 in the soils.

Soil	Adsorption[1,2]				Desorption			
	K	1/N	R^2	K_{oc}	K	1/N	R^2	K_{oc}
Silt loam 96/19	1.9733	0.841	1.000	264	19.18	0.911	0.932	3836
Sandy loam 98/32	3.5727	0.887	0.997	216	9.75	0.853	0.711	812
Silt loam 97/10	2.6898	0.879	1.000	98	26.64	1.019	0.993	1402
Sandy clay loam 00/03	8.2787	0.921	1.000	242	16.95	0.971	0.999	652
Loam 98/26	11.8766	0.863	0.999	393	22.83	0.904	0.995	1202

Data were obtained from p. 22; Table 5, p. 34; Tables 6-7, p. 35; Tables 8-12, pp. 36-37; and Appendices 5-7, pp. 89-111 of the study report.

K_d -Adsorption and desorption coefficients; K - Freundlich adsorption and desorption coefficients; 1/N -Slope of Freundlich adsorption/desorption isotherms.

K_{oc} - Coefficient adsorption per organic carbon (K_d or K x 100/% organic carbon).

R^2 - Regression coefficient of Freundlich equation.

[1] Adsorption K_d values were reviewer-calculated using the following equation:

$$Kd = \frac{\left[\frac{(C_0V_0 - C_{eq}V_0)}{m}\right]}{C_{eq}}$$

where

S = the sorbed phase concentration with units of mass of sorbate per solid sorbent mass;

C_0 = the concentration in the water before sorption;

V_0 = the total water volume in the batch system;

C_{eq} = the aqueous-phase equilibrium concentration; and

m = the dry mass of sorbent.

[2] Freundlich K_{ads} values calculated by the study author were 1.32, 2.59, 1.86, 6.29, and 7.47 for the silt loam 96/19, sandy loam 98/32, silt loam 97/10, sandy clay loam 00/03, and loam 98/26 soils, respectively (see Reviewer Comment No. 1).

C. ADSORPTION: After 1 hour of equilibration, 25.7-35.0% and 55.1-58.0% of the applied [^{14}C]RPA 221607 was adsorbed to the silt loam 97/10 soil and sandy clay loam sediment, respectively (Tables 8-12, pp. 36-37). After 24 hours of equilibration, 20.3-32.0%, 33.4-43.5%, and 63.0-68.3% of the applied was adsorbed to the silt loam 96/19, sandy loam, and loam soils, respectively. Adsorption K_d values were 1.9733, 3.5727, 2.6898, 8.2787, and 11.8766 for the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively; corresponding K_{oc} values were 264, 216, 98, 242, and 393 (Table 6, p. 35).

D. DESORPTION: At the end of the desorption phase, 74.7-88.6%, 73.1-88.2%, 85.3-98.7%, 73.3-87.8%, and 54.8-71.2% of the applied ^{14}C was desorbed from the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil, respectively (Tables 21-25, pp. 50-51). Desorption K_d values were 19.18, 9.75, 26.64, 16.95, and 22.83 for the silt loam 96/19 soil, sandy loam soil, silt loam 97/10 soil, sandy clay loam sediment, and loam soil,

respectively; corresponding K_{oc} values were 3836, 812, 1402, 652, and 1202 (Table 7, p. 35).

III. STUDY DEFICIENCIES: The objective of this study was to study the sorptive behaviour of the fenamidone metabolite RPA 221607 in four soils and one sediment with varying soil characteristics. None of the study deficiencies noted are considered to be of sufficient concern to cause the study to be judged scientifically invalid. However, since a metabolite of fenamidone was studied rather than the parent compound parent compound, this study cannot be used to fulfill Subdivision N Guideline §163-1. This study does aid in understanding the overall environmental fate of fenamidone.

IV. REVIEWER'S COMMENTS:

1. The study authors calculated adsorption K values using the Freundlich isotherm equation (p. 26):

$$C_{s1} = K_F \times C_{w1}^{(1/n)}$$

where
K_F = Freundlich adsorption coefficient at equilibrium;
C_{w1} = concentration of adsorption solution at equilibrium;
C_{s1} = concentration in soil at equilibrium; and
1/n = constant.

The study authors calculated desorption K values using the following Freundlich equation (p. 27):

$$C_{sx} = K_{des} \times C_{wx}^{(1/n)}$$

where
C_{sx} = concentration adsorbed to soil at equilibrium;
C_{wx} = concentration in solution at equilibrium; and
1/n = constant.

Freundlich adsorption and desorption constants of [^{14}C]RPA 221607 in the soils.

Soil	Adsorption				Desorption[1]			
	K	1/N	R^2	K_{oc}	K	1/N	R^2	K_{oc}
Silt loam 96/19	1.32	0.841	1.000	264	19.18	0.911	0.932	3836
Sandy loam 98/32	2.59	0.887	0.997	216	9.75	0.853	0.711	812

Soil	Adsorption				Desorption[1]			
	K	1/N	R^2	K_{oc}	K	1/N	R^2	K_{oc}
Silt loam 97/10	1.86	0.879	1.000	98	26.64	1.019	0.993	1402
Sandy clay loam 00/03	6.29	0.921	1.000	242	16.95	0.971	0.999	652
Loam 98/26	7.47	0.863	0.999	393	22.83	0.904	0.995	1202

Data were obtained from Tables 6-7, p. 35 and Appendices 5-7, pp. 89-111 of the study report.
[1] Desorption values reported for fifth desorption step.
K_d-Adsorption and desorption coefficients; K - Freundlich adsorption and desorption coefficients; 1/N -Slope of Freundlich adsorption/desorption isotherms.
K_{oc} - Coefficient adsorption per organic carbon (K_d or K x 100/% organic carbon).
R^2 - Regression coefficient of Freundlich equation.

2. RPA 221607 has medium to high mobility, based on K_{oc} values of 98 to 393 (mean 243) for the four test soils and sediment (p. 30). A slightly nonlinear relationship was observed between the concentration of RPA 221607 adsorbed and the concentration of RPA 221607 in solution for all the test soils and sediment. For the four test soils and sediment, adsorption was not fully reversible, with hysteresis in the adsorption/desorption curve (p. 29). Desorption K values increased with each desorption step, indicating that RPA 221607 becomes more difficult to desorb with each desorption step (see table below). The study authors concluded that, under field conditions, RPA 221607 would have much lower actual mobility than that predicted by the adsorption values calculated for this study. The reviewer noted similar behavior for the mobility of fenamidone and other fenamidone transformation products (MRID 45930002, reviewed in this submission; MRIDs 45385823, -24, -25, -26, and -27, reviewed in previous submission).

Freundlich desorption constants of [^{14}C]RPA 221607 in soils and sediment following five desorption steps.[1]

Serial desorption of RPA 221607				
Desorption step	**K_d**	**1/N**	**R^2**	**K_{oc}**
Silt loam 96/19 soil				
First	2.64	0.848	0.992	529
Second	4.82	0.856	0.981	964
Third	8.03	0.863	0.967	1605
Fourth	12.43	0.872	0.946	2486
Fifth	19.18	0.911	0.932	3836
Sandy loam 98/32 soil				

Serial desorption of RPA 221607				
Desorption step	**K_d**	**1/N**	**R^2**	**K_{oc}**
First	3.98	0.901	0.990	331
Second	5.56	0.894	0.959	463
Third	8.19	0.896	0.905	682
Fourth	9.44	0.877	0.843	786
Fifth	9.75	0.853	0.711	812
Silt loam 97/10 soil				
First	2.69	0.882	0.999	142
Second	4.05	0.896	0.999	213
Third	6.70	0.931	0.997	353
Fourth	13.78	0.980	0.995	725
Fifth	26.64	1.019	0.993	1402
Sandy clay loam 00/03 sediment				
First	7.76	0.920	1.000	299
Second	9.14	0.924	1.000	351
Third	10.54	0.930	0.999	405
Fourth	13.81	0.954	0.999	531
Fifth	16.95	0.971	0.999	652
Loam 98/26 soil				
First	10.46	0.872	0.999	551
Second	13.34	0.890	0.998	702
Third	16.36	0.891	0.997	861
Fourth	19.60	0.902	0.996	1032
Fifth	22.83	0.904	0.995	1202

[1] Data were obtained from Tables 13-17, pp. 38-48 of the study report.

3. According to the McCall et. al. classification system, RPA 221607 had medium to highly mobile in the silt loam 96/19 soil, sandy loam 98/32 soil, silt loam 97/10 soil, sandy clay loam 00/03 sediment, and loam 98/26 soil (p. 27; Table 26, p. 51).

4. The 1/n values associated with the adsorption K for all of the test soils were below 0.9 (1/n = 0.841 to 0.887; Table 6, p. 35). The 1/n values associated with desorption K were below 0.9 for the sandy loam 98/32 soil (1/n = 0.853; Table 7, p. 35). If the 1/n value is not within the range of 0.9 to 1.1, then the Freundlich isotherm may not adequately or accurately represent adsorption of the compound across all concentrations.

5. For the silt loam 96/19 soil, the test concentration for one replicate (tube 913) was inconsistent with the other test concentrations (p. 28; Table 13, pp. 38-39). The study authors considered this replicate to be an outlier, and excluded this sample from the Freundlich value calculations.

6. The amount of RPA 221607 (µg) adsorbed to the soils and sediment was calculated as the difference between the amount applied and the amount in the supernatant solution (pp. 26-27). Allowances were made for RPA 221607 in the residual water following the adsorption and desorption steps.

7. The test substance was incompletely characterized; physical descriptions were not reported. The physico-chemical properties of RPA 221607 were incomplete; vapour pressure, UV adsorption, melting point, bulk density, pK_a, K_{ow}, and the stability of the test substance was not reported.

8. Three of the five test soils (loam 98/26 soil, silt loam 97/10 soil and sandy clay loam 00/03 sediment) were foreign in origin (Table 1, p. 32). However, these test soils were characterized using the USDA classification system and were comparable to U.S. soils.

9. The test soils were incompletely described; the bulk density and the soil biomass were not reported.

10. A complete description of the test soil collection and storage was not provided; pesticide use history at the collection site, collection procedures, sampling depth, storage conditions, and storage length were not reported.

11. The concentration of the co-solvent, acetonitrile, in the test solutions used in the definitive study was not reported. The available data were insufficient for the reviewer to calculate the acetonitrile concentration in the test solutions.

12. The definitive study temperature was reported as 20 ± 1°C. More detailed information was not provided. It is preferred that minimum, maximum, and average temperatures be reported. Any significant deviations from the average and their duration should be noted.
13. Complete details of the LSC and HPLC methodology were not reported. Method detection limits for LSC and HPLC analyses were not reported. Combustion efficiency was not reported.

13. Graphical representations of the Freundlich isotherms for RPA 221607 adsorption/desorption of the five test soils are presented in Figure 3, p. 54 and Figures 5-9, pp. 55-57 of the study report.

14. All data were generated using a Thermo Labsystems Laboratory Information Management System (LIMS; p. 24).

V. REFERENCES:

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 163-1. Mobility studies. Office of Pesticide and Toxic Substances, Washington, DC. EPA 540/9-82-021.

2. U.S. Environmental Protection Agency. 1989. FIFRA Accelerated Reregistration, Phase 3 Technical Guidance. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 540/09-90-078.

3. U.S. Environmental Protection Agency. 1993. Pesticide Registration Rejection Rate Analysis - Environmental Fate. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 738.

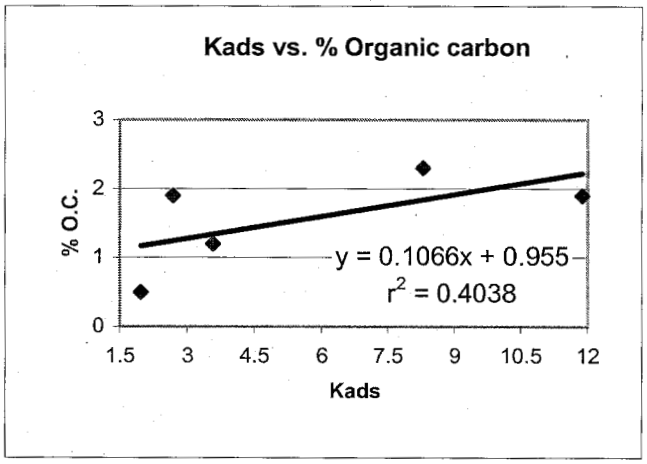
4. U.S. Environmental Protection Agency. 2003. Guidance for Calculating Sorption Coefficients in Batch Equilibrium Studies.

Attachment 1

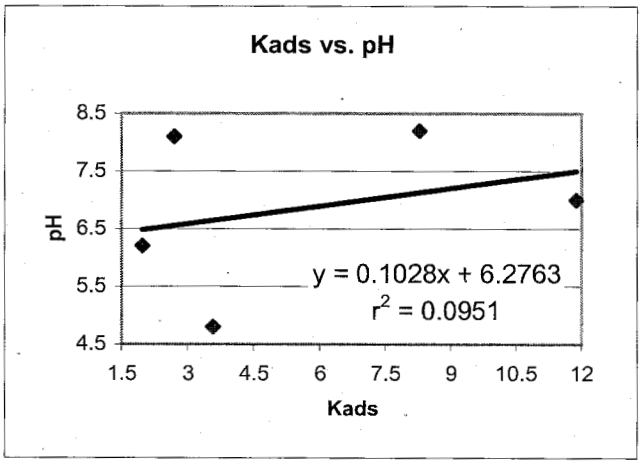
Excel Spreadsheets

Chemical: RPA 221607 (metabolite of fenamidone)
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

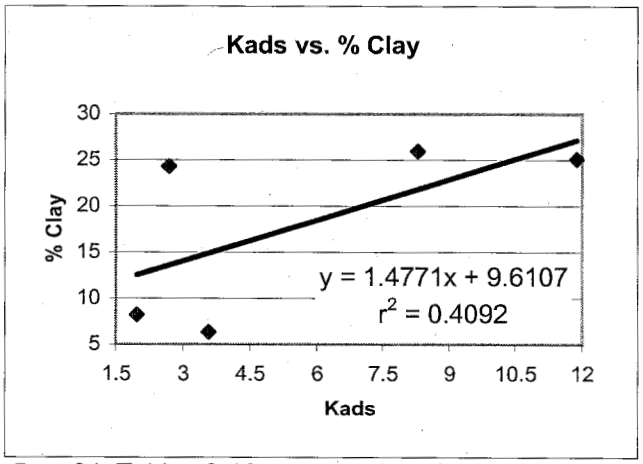
Soil	Kads	% organic carbon
Silt loam	1.9733	0.5
Sandy loam	3.5727	1.2
Silt loam	2.6898	1.9
Sandy clay loam	8.2787	2.3
Loam	11.8766	1.9



Soil	Kads	pH
Silt loam	1.9733	6.2
Sandy loam	3.5727	4.8
Silt loam	2.6898	8.1
Sandy clay loam	8.2787	8.2
Loam	11.8766	7



Soil	Kads	% clay
Silt loam	1.9733	8.23
Sandy loam	3.5727	6.35
Silt loam	2.6898	24.31
Sandy clay loam	8.2787	25.98
Loam	11.8766	25.12



Data were obtained from p. 21; Table 1, p. 32; Table 5, p. 34; Tables 8-12, pp. 36-37; and Appendices 5-7, pp. 89-111 of the study report. The Kads was determined by the reviewer using the following equation: Kd= [(CoVo) - (Ceq)Vo)/m]/Ceq.

Chemical: RPA 221607 (metabolite of fenamidone)
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Silt loam 96/19- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.9966	75	2.39602	75	15	3.0029	1.2533	
2.9966	75	2.38444	75	15	3.0608	1.2837	
0.3986	75	0.30543	75	15	0.4659	1.5252	
0.3986	75	0.30174	75	15	0.4843	1.6050	
0.0729	75	0.05066	75	15	0.1112	2.1950	
0.0729	75	0.05039	75	15	0.1126	2.2336	
0.0184	75	0.01221	75	15	0.0310	2.5348	
0.0184	75	0.01128	75	15	0.0356	3.1560	
						1.9733	AVG

Sandy loam 98/32- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.9966	75	1.89268	75	15	5.5196	2.9163	
2.9966	75	1.93559	75	15	5.3051	2.7408	
0.3986	75	0.26161	75	15	0.6850	2.6182	
0.3986	75	0.25391	75	15	0.7235	2.8492	
0.0729	75	0.041	75	15	0.1595	3.8902	
0.0729	75	0.03966	75	15	0.1662	4.1906	
0.0184	75	0.00969	75	15	0.0436	4.4943	
0.0184	75	0.00931	75	15	0.0455	4.8818	
						3.5727	AVG

Silt loam 97/10- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.9966	75	2.16704	75	15	4.1478	1.9140	
2.9966	75	2.18296	75	15	4.0682	1.8636	
0.3986	75	0.26381	75	15	0.6740	2.5547	
0.3986	75	0.26322	75	15	0.6769	2.5716	
0.0729	75	0.04644	75	15	0.1323	2.8488	
0.0729	75	0.04614	75	15	0.1338	2.8999	
0.0184	75	0.01115	75	15	0.0363	3.2511	
0.0184	75	0.01068	75	15	0.0386	3.6142	
						2.6898	AVG

Data were obtained from p. 22; Table 5, p. 34; and Tables 8-12, pp. 36-37 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Sandy clay loam 00/03- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.9966	75	1.33093	75	15	8.3284	6.2575	
2.9966	75	1.24849	75	15	8.7406	7.0009	
0.3986	75	0.15954	75	15	1.1953	7.4922	
0.3986	75	0.15616	75	15	1.2122	7.7626	
0.0729	75	0.02575	75	15	0.2358	9.1553	
0.0729	75	0.02577	75	15	0.2357	9.1444	
0.0184	75	0.00626	75	15	0.0607	9.6965	
0.0184	75	0.00625	75	15	0.0608	9.7200	
						8.2787	AVG

Loam 98/26- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.9966	75	1.15911	75	15	9.1875	7.9263	
2.9966	75	1.16164	75	15	9.1748	7.8981	
0.3986	75	0.13929	75	15	1.2966	9.3083	
0.3986	75	0.13763	75	15	1.3049	9.4809	
0.0729	75	0.01972	75	15	0.2659	13.4838	
0.0729	75	0.01921	75	15	0.2685	13.9745	
0.0184	75	0.0043	75	15	0.0705	16.3953	
0.0184	75	0.00427	75	15	0.0707	16.5457	
						11.8766	AVG

Data were obtained from p. 22; Table 5, p. 34; and Tables 8-12, pp. 36-37 of the study report.

Chemical: RPA 221607 (metabolite of fenamidone)
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Table 4/6 Adsorption soil

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	2.84717	5.2296	3.64327	7.58035	8.81821
2.8	2.8418	4.86805	3.55838	8.30218	8.8266
AVG	2.8445	5.0488	3.6008	7.9413	8.8224
STDEV	0.00	0.26	0.06	0.51	0.01
0.4	0.44325	0.65138	0.60632	1.14238	1.27062
0.4	0.46829	0.68399	0.60264	1.14703	1.25728
AVG	0.4558	0.6677	0.6045	1.1447	1.2640
STDEV	0.02	0.02	0.00	0.00	0.01
0.08	0.10835	0.14978	0.12213	0.21973	0.25506
0.08	0.10694	0.15594	0.1215	0.22098	0.25815
AVG	0.1076	0.1529	0.1218	0.2204	0.2566
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.0297	0.04272	0.03418	0.05805	0.0688
0.02	0.03436	0.0443	0.03575	0.05801	0.06789
AVG	0.0320	0.0435	0.0350	0.0580	0.0683
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 8-12, pp. 36-37 of the study report.

Table 5 Adsorption supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	73.73	59.06	67.61	40.19	34.5
2.8	73.2	60.39	68.17	37.18	34.41
0.4	70.72	61.54	61.91	36.37	31.07
0.4	69.78	59.61	61.59	35.54	30.66
0.08	64.01	52.49	59.67	32.23	23.97
0.08	63.66	50.81	59.15	32.14	23.4
0.02	61.25	48.81	56.72	31.17	20.73
0.02	56.61	47.25	54.34	31.1	20.58
AVG	66.62	55.00	61.15	34.49	27.42
STDEV	6.16	5.75	4.84	3.33	5.88

Data were obtained from Tables 21-25, pp. 50-51 of the study report.

Chemical: RPA 221607
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Table 5 Desorption 1 supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	14.5	18.82	18.76	21.31	17.32
2.8	14.7	19.31	18.82	21.47	18.23
0.4	16.67	21.03	20.08	20.11	17.18
0.4	5.96	21.31	19.7	20.45	17.41
0.08	16.37	20.29	19.92	19.28	14.56
0.08	16.88	20.23	20.52	20	15.02
0.02	16.29	19.72	19.9	18.78	13.3
0.02	16.52	19.72	20.27	17.83	13.32
AVG	14.74	20.05	19.75	19.90	15.79
STDEV	3.66	0.84	0.64	1.24	1.97

Table 5 Desorption 2 supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	4.23	6.67	6.3	12.34	11.01
2.8	4.33	7.09	6.37	12.14	10.31
0.4	5.4	8.41	7.58	12.88	11.45
0.4	5.7	-	7.61	12.62	11.82
0.08	5.79	8.8	8.29	12.75	10.52
0.08	5.88	8.78	8.35	12.7	10.34
0.02	6	8.6	8.64	12.06	9.61
0.02	5.97	8.72	8.69	11.79	9.84
AVG	5.41	8.15	7.73	12.41	10.61
STDEV	0.72	0.89	0.95	0.39	0.76

Table 5 Desorption 3 supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	1.69	2.88	2.52	7.57	6.59
2.8	1.8	3.08	2.5	7.44	6.65
0.4	2.31	4.09	3.36	8.13	7.19
0.4	1.37	-	3.28	8.34	7.42
0.08	2.65	3.78	4.01	8.47	7.02
0.08	2.5	4.22	4.11	8.61	6.89
0.02	2.77	4.29	4.42	8.07	6.57
0.02	2.97	4.37	4.39	8.18	6.61
AVG	2.26	3.82	3.57	8.10	6.87
STDEV	0.57	0.60	0.78	0.41	0.32

Data were obtained from Tables 21-25, pp. 50-51 of the study report.

Chemical: RPA 221607
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Table 5 Desorption 4 supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	0.82	1.75	1.07	4.28	4.71
2.8	0.87	1.78	1.06	4.43	4.69
0.4	1.23	2.23	1.58	5.25	5.31
0.4	2.63	-	1.61	5.11	5.51
0.08	1.45	2.35	2.04	5.67	5.4
0.08	1.4	2.44	1.97	5.57	5.29
0.02	1.52	2.59	2.27	5.59	5.23
0.02	1.67	2.55	2.26	5.69	5.24
AVG	1.45	2.24	1.73	5.20	5.17
STDEV	0.56	0.35	0.49	0.56	0.31

Table 5 Desorption 5 supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	0.53	0.99	0.54	3.05	3.17
2.8	0.55	1.02	0.54	2.97	3.42
0.4	0.81	1.37	0.85	3.62	3.98
0.4	0.94	-	0.88	3.57	4.1
0.08	1.03	1.47	1.12	4.09	4.2
0.08	1	1.55	1.18	4.06	4.03
0.02	1.14	1.62	1.38	4.19	3.97
0.02	1.39	1.61	1.39	4.15	4.15
AVG	0.92	1.38	0.99	3.71	3.88
STDEV	0.29	0.27	0.34	0.49	0.37

Table 5 Extracted

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	1.6	3.08	1.09	5.86	12.11
2.8	-	-	-	-	2.52
0.4	-	-	-	-	-
0.4	-	-	-	-	-
0.08	-	-	-	-	-
0.08	-	-	-	-	-
0.02	-	-	-	-	-
0.02	-	-	-	-	-
AVG	1.60	3.08	1.09	5.86	7.30
STDEV					6.80

Data were obtained from Tables 21-25, pp. 50-51 of the study report.

Chemical: RPA 221607
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Table 5 Combusted

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	1.17	1.42	0.65	0.66	4.65
2.8	2.9	4	0.12	6.98	18.07
0.4	5.23	6.41	0.21	11.83	27.38
0.4	5.06	-	3.23	11.52	27.48
0.08	7.51	9.19	4.15	14.85	31.04
0.08	6.42	9.06	4.54	15.18	31.51
0.02	9.38	10.11	6.37	17.5	32.16
0.02	9.7	9.32	6.31	17.64	32.07
AVG	5.92	7.07	3.20	12.02	25.55
STDEV	2.97	3.28	2.60	5.79	9.65

Table 5 Recovery

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	98.28	94.68	97.45	95.26	94.07
2.8	98.34	96.65	97.58	92.62	95.78
0.4	102.37	97.15	95.57	98.18	103.55
0.4	91.45	92.54	97.9	97.14	104.4
0.08	98.81	99.31	99.21	97.35	96.71
0.08	97.75	98.69	99.83	98.26	96.48
0.02	98.35	98.46	99.7	97.35	91.58
0.02	94.82	98.61	97.65	96.38	91.8
AVG	97.52	97.01	98.11	96.57	96.80
STDEV	3.19	2.34	1.42	1.86	4.84

Data were obtained from Tables 21-25, pp. 50-51 of the study report.

Table 6 Adsorption supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	2.39602	1.89268	2.16704	1.33093	1.15911
2.8	2.38444	1.93559	2.18296	1.24849	1.16164
AVG	2.3902	1.9141	2.1750	1.2897	1.1604
STDEV	0.01	0.03	0.01	0.06	0.00
0.4	0.30543	0.26161	0.26381	0.15954	0.13929
0.4	0.30174	0.25391	0.26322	0.15616	0.13763
AVG	0.3036	0.2578	0.2635	0.1579	0.1385
STDEV	0.00	0.01	0.00	0.00	0.00
0.08	0.05066	0.041	0.04644	0.02575	0.01972
0.08	0.05039	0.03966	0.04614	0.02577	0.01921
AVG	0.0505	0.0403	0.0463	0.0258	0.0195
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.01221	0.00969	0.01115	0.00626	0.0043
0.02	0.01128	0.00931	0.01068	0.00625	0.00427
AVG	0.0117	0.0095	0.0109	0.0063	0.0043
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 8-12, pp. 36-37 of the study report.

Chemical: RPA 221607
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Table 6 % Adsorption

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	20.34	37.35	26.02	54.14	62.99
2.8	20.3	34.77	25.42	59.3	63.05
AVG	20.32	36.06	25.72	56.72	63.02
STDEV	0.03	1.82	0.42	3.65	0.04
0.4	22.16	32.57	30.32	57.12	63.53
0.4	23.41	34.2	30.13	57.35	62.86
AVG	22.79	33.39	30.23	57.24	63.20
STDEV	0.88	1.15	0.13	0.16	0.47
0.08	27.09	37.44	30.53	54.93	63.76
0.08	26.74	38.98	30.38	55.24	64.54
AVG	26.92	38.21	30.46	55.09	64.15
STDEV	0.25	1.09	0.11	0.22	0.55
0.02	29.7	42.72	34.18	58.05	68.8
0.02	34.36	44.3	35.75	58.01	67.89
AVG	32.0300	43.5100	34.9650	58.0300	68.3450
STDEV	3.30	1.12	1.11	0.03	0.64

Table 7 Desorption soil

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	0.64795	1.42884	0.45861	1.5346	3.22887
2.8	0.64236	1.033	0.36074	2.04766	3.17994
AVG	0.6452	1.2309	0.4097	1.7911	3.2044
STDEV	0.00	0.28	0.07	0.36	0.03
0.4	0.05397	0.02387	0.0876	0.25742	0.45877
0.4	-	-	0.10024	0.26908	0.43671
AVG	0.0540	0.0239	0.0939	0.2633	0.4477
STDEV			0.01	0.01	0.02
0.08	0.03078	0.03759	0.0173	0.05889	0.11881
0.08	0.03011	0.04148	0.0162	0.05722	0.12166
AVG	0.0304	0.0395	0.0168	0.0581	0.1202
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.00977	0.01303	0.00599	0.01757	0.03617
0.02	0.01323	0.01431	0.00764	0.01858	0.0353
AVG	0.0115	0.0137	0.0068	0.0181	0.0357
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 13-17, pp. 38-47 of the study report.

Chemical: RPA 221607
PC Code: 046679
MRID: 45930003
Guideline No: 163-1

Table 7 Desorption supernatant

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	0.01592	0.02998	0.0166	0.09123	0.09767
2.8	0.01606	0.02997	0.01654	0.09182	0.1018
AVG	0.0160	0.0300	0.0166	0.0915	0.0997
STDEV	0.00	0.00	0.00	0.00	0.00
0.4	0.00324	0.00554	0.00347	0.01514	0.01609
0.4	0.00376	-	0.00334	0.0148	0.01626
AVG	0.0035	0.0055	0.0034	0.0150	0.0162
STDEV	0.00		0.00	0.00	0.00
0.08	0.00076	0.00106	0.0009	0.00301	0.00304
0.08	0.00072	0.00112	0.00088	0.003	0.00286
AVG	0.0007	0.0011	0.0009	0.0030	0.0030
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.00022	0.0003	0.00027	0.00083	0.00073
0.02	0.00026	0.0003	0.00026	0.0008	0.00075
AVG	0.0002	0.0003	0.0003	0.0008	0.0007
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 13-17, pp. 38-47 of the study report.

Table 7 % desorbed as % of the adsorbed

	Silt loam	Sandy loam	Silt loam	Sandy clay loam	Loam
2.8	88.68	87.34	97.82	88.16	71.85
2.8	88.5	89.02	99.59	87.39	70.56
AVG	88.59	88.18	98.71	87.78	71.21
STDEV	0.13	1.19	1.25	0.54	0.91
0.4	83.48	104.27	99.38	80.88	62.24
0.4	76.6	64.71	91.1	81.31	62.73
AVG	80.04	84.49	95.24	81.10	62.49
STDEV	4.86	27.97	5.85	0.30	0.35
0.08	78.42	78.36	89.48	77.18	57.33
0.08	81.14	77.74	88.82	77.04	56.88
AVG	79.78	78.05	89.15	77.11	57.11
STDEV	1.92	0.44	0.47	0.10	0.32
0.02	74.72	74.16	85.18	73.57	54.59
0.02	74.64	71.98	85.43	72.98	54.98
AVG	74.68	73.07	85.31	73.28	54.79
STDEV	0.06	1.54	0.18	0.42	0.28

Data were obtained from Tables 21-25, pp. 50-51 of the study report.

Attachment 2

Structures of Parent and Transformation Products

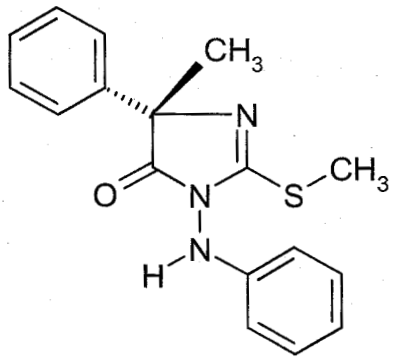
RPA 407213

IUPAC name: (*S*)-5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one
(*S*)-4-Methyl-2-methylthio-4-phenyl-1-phenylamino-5(4H)-imidazolone

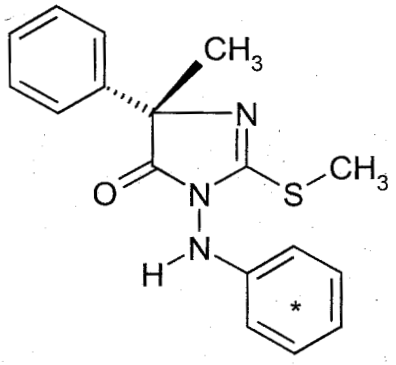
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (S)-

CAS #: 161326-34-7

Unlabeled



With radiolabel



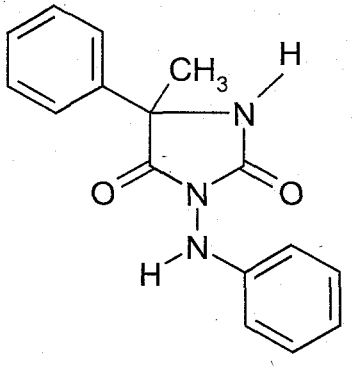
*Position of [^{14}C]-radiolabel.

RPA 405862

IUPAC name: 5-Methyl-5-phenyl-3-phenylaminoimidazolidine-2,4-dione

CAS name: 2,4-Imidazolidinedione, 5-methyl-5-phenyl-3-(phenylamino)-

CAS #: 153969-11-0

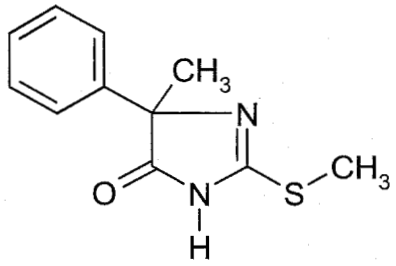


RPA 408056

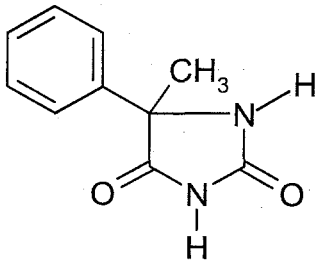
IUPAC name: 5-Methyl-2-methylthio-5-phenyl-3,5-dihydroimidazol-4-one
4-Methyl-2-methylthio-4-phenyl-2-imidazolin-5-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-

CAS #: N/A



RPA 717879
IUPAC name: 5-Methyl-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-5-phenyl-
CAS #: 6843-49-8

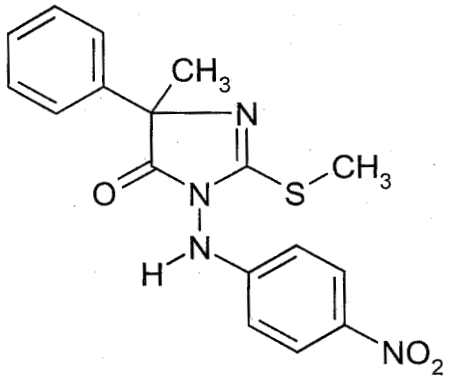


RPA 406012

IUPAC name: 5-Methyl-2-methylthio-3-(4-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-[(4-nitrophenyl)amino]-5-phenyl-

CAS #: 151022-56-9
451022-66-9

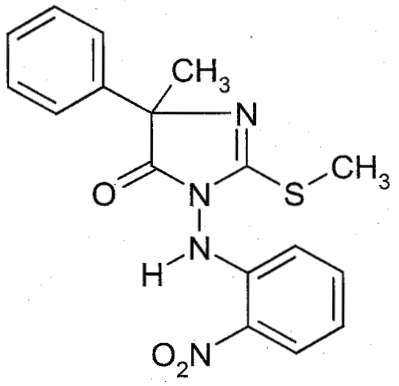


RPA 410914

IUPAC name: 5-Methyl-2-methylthio-3-(2-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one
(4RS)-4-methyl-2-methylthio-(1H)-1-(2-nitrophenylamino)-4-phenyl-2-imidazolin-5-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-(2-nitrophenylamino)-5-phenyl-

CAS #: N/A

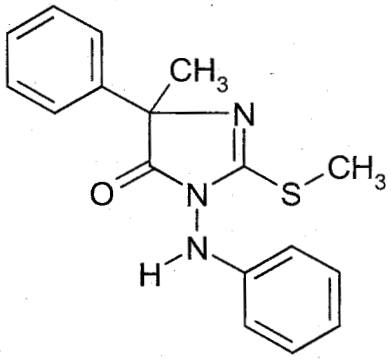


RPA 405803

IUPAC name: 5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one

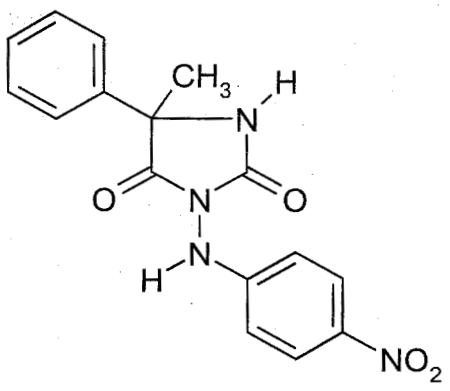
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-

CAS #: 151022-37-6

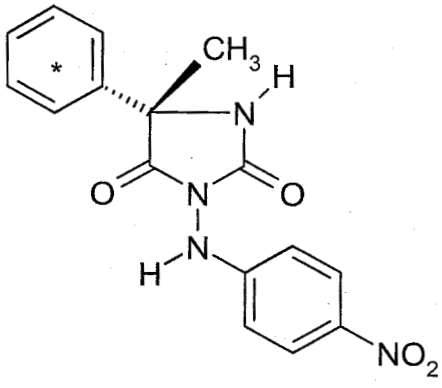


RPA 409446
IUPAC name: 5-Methyl-3-(4-nitrophenylamino)-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-(4-nitrophenylamino)-5-phenyl-
CAS #: N/A

Unlabeled



With radiolabel



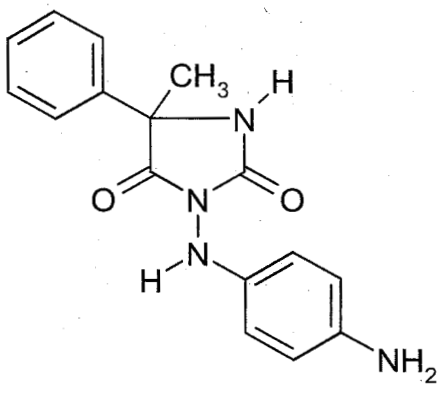
*Position of [^{14}C]-radiolabel.

RPA 409445

IUPAC name: 3-(4-Aminophenylamino)-5-methyl-5-phenylimidazolidine-2,4-dione

CAS name: 2,4-Imidazolidinedione, 3-(4-aminophenylamino)-5-methyl-5-phenyl-

CAS #: N/A

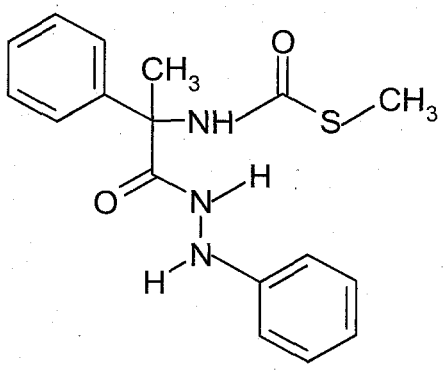


RPA 407599

IUPAC name: [1-Phenyl-1-(N'-phenylhydrazinocarbonyl)-ethyl]-thiocarbamic acid S-methyl ester

CAS name: Benezeneacetic acid, α-methyl-N-thiocarboxy-, S-methyl ester, 2-phenylhydrazide

CAS #: N/A

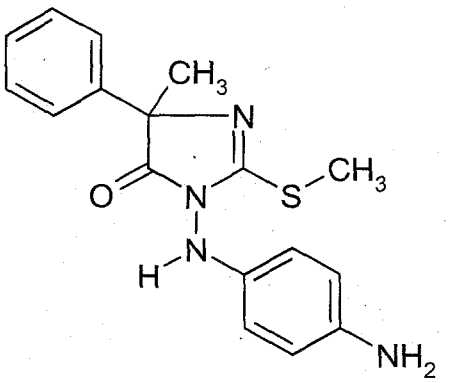


RPA 409352

IUPAC name: 3-(4-Aminophenylamino)-5-methyl-2-methylthio-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-3-(4-aminophenylamino)-5-methyl-2-(methylthio)-5-phenyl-

CAS #: N/A

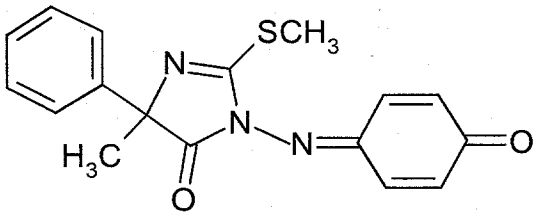


RPA 418915

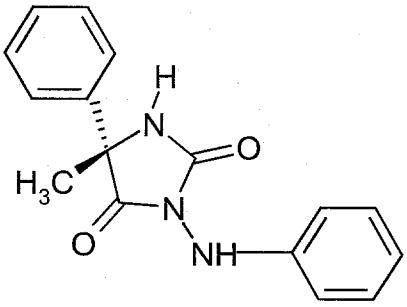
IUPAC name: (*S*)-5-Methyl-2-methylthio-3-[4-oxo-2,5-cyclohexadien-1-ylidene)amino]-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: N/A

CAS #: N/A



RPA 410193
IUPAC name: (*S*)-4-Methyl-4-phenyl-1-phenylaminoimidazolidin-2,5-dione
CAS name: N/A
CAS #: N/A

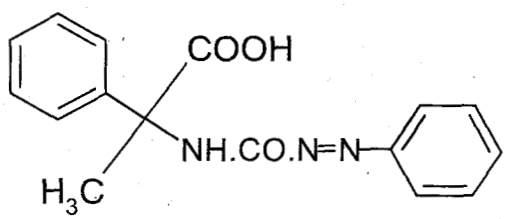


RPA 409344

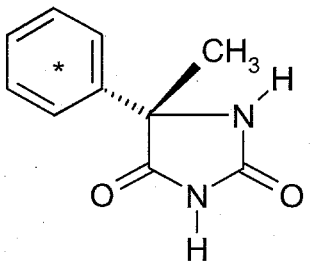
IUPAC name: (R,S)-2-methyl-2-phenyl-N-(phenylazocarbonyl)glycine
(R,S)-2-phenyl-2-(phenylazocarbonylamino)propionic acid

CAS name: N/A

CAS #: N/A



RPA 412636
IUPAC name: (*S*)-5-Methyl-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione,5-methyl-5-phenyl-, (S)
CAS #: 27539-12-4



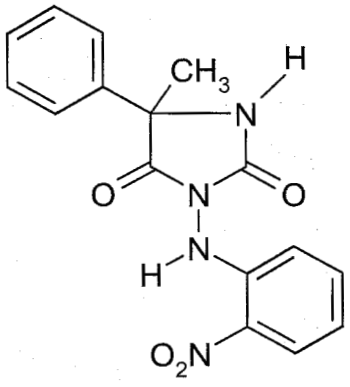
* Position of [^{14}C] radiolabel.

RPA 410995

IUPAC name: 5-Methyl-3-(2-nitrophenylamino)-5-phenylimidazolidine-2,4-dione

CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-

CAS #: N/A

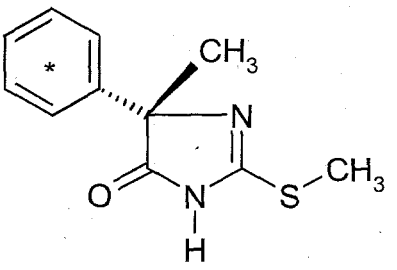


RPA 412708

IUPAC name: (*S*)-5-Methyl-2-methylthio-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-,(S)-

CAS #: N/A

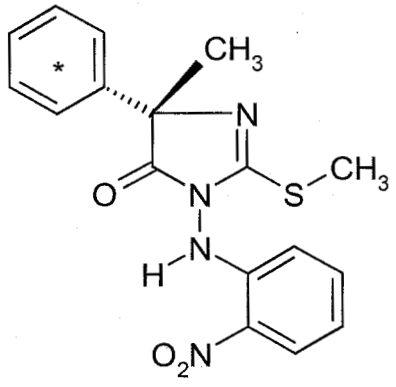


RPA 413255

IUPAC name: (*S*)-5-Methyl-2-methylthio-3-(2-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-(2-nitrophenylamino)-5-phenyl-,(S)-

CAS #: N/A



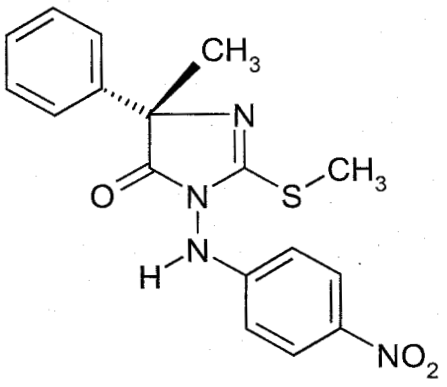
* Position of [^{14}C] radiolabel.

RPA 411639

IUPAC name: (*S*)-5-Methyl-2-methylthio-3-(4-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one

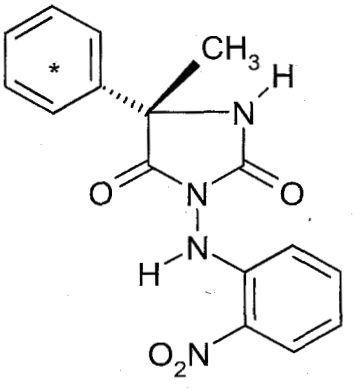
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-[(4-nitrophenyl)amino)-5-phenyl-,(S)-

CAS #: N/A



RPA 221701

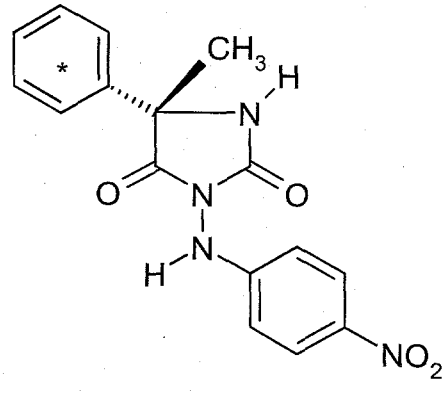
IUPAC name: (S)-5-Methyl-3-(2-nitrophenylamino)-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-, (S)-
CAS #: N/A



*Position of [^{14}C]-radiolabel.

RPA 221607

IUPAC name: (S)-5-Methyl-3-(4-nitrophenylamino)-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-, (S)-
CAS #: N/A



*Position of [^{14}C]-radiolabel.